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EXAMINER

PHAN, HANH

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Please find below and/or attached an Office communication concerning this application or proceeding.



## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 9, 11, 14, 15, 20, 23, 27-30, 33, 35 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Kwa (US Patent No. 5,255,111).

Regarding claims 1, 23, 28 and 35, referring to Figures 1 and 2, Kwa teaches a method, comprising:

generating (i.e., electro-optic transducer means 17, Fig. 1) an optical transmit signal in response to an electrical transmit signal (i.e., col. 4, lines 10-67 and col. 5, lines 1-50);

coupling the optical transmit signal into a single communication link (i.e., optical fiber transmission 30, Fig. 1) for transmission there over;

receiving (i.e., electro-optic transducer means 27, Fig. 1) an optical receive signal from the single communication link, the optical receive signal having a same communication wavelength as the optical transmit signal (i.e., col. 4, lines 10-67 and col. 5, lines 1-50); and

generating an electrical receive signal in response to the received optical receive signal (i.e., Figs. 1 and 2, col. 4, lines 10-67 and col. 5, lines 1-50).

Regarding claims 2, 15 and 29, Kwa further teaches wherein coupling the optical transmit signal into the single communication link (i.e., optical fiber 30, Figs. 1 and 2) comprises coupling the optical transmit signal into a single optical waveguide and wherein receiving the optical receive signal from the single communication link comprises receiving the optical receive signal from the single optical waveguide.

Regarding claims 3 and 30, Kwa further teaches wherein the optical transmit signal is generated during a transmit interval and wherein the optical receive signal is received during a receive interval, the transmit interval and the receive interval alternating back and forth (i.e., col. 4, lines 10-67, col. 5, lines 1-67 and col. 6, lines 1-50).

Regarding claims 9 and 33, Kwa further teaches the optical transmit signal and the optical receive signal simultaneously propagate along the single optical waveguide in opposite directions (Figs. 1 and 2).

Regarding claim 11, Kwa further teaches generating the optical transmit signal comprises directly modulating a diode and wherein receiving the optical receive signal comprises receiving the optical receive signal with the diode (Figs. 1 and 2).

Regarding claim 14, referring to Figures 1 and 2, Kwa teaches a half-duplex transceiver, comprising:

an optical semiconductor device ("OSD") (i.e., EOT 16, Fig. 2) to generate an optical transmit signal having a first wavelength for transmission along a communication link and to receive an optical receive signal having a second wavelength from the communication link, the OSD to generate the optical transmit signal in response to an

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electrical transmit signal and to generate an electrical receive signal in response to the optical receive signal (i.e., col. 4, lines 10-67, col. 5, lines 1-67 and col. 6, lines 1-50;

a physical media driver ("PMD") (Fig. 2) electrically coupled to the OSD, the PMD to amplify the electrical receive signal during a receive mode and to drive the OSD with the electrical transmit signal during a transmit mode (i.e., col. 4, lines 10-67, col. 5, lines 1-67 and col. 6, lines 1-50; and

a data link device ("DLD") (i.e., input/output data 18, Figs. 1 and 2) electrically coupled to the PMD to switch the PMD between the receive mode and the transmit mode (i.e., col. 4, lines 10-67, col. 5, lines 1-67 and col. 6, lines 1-50).

Regarding claims 20, 27 and 38, Kwa further teaches the first wavelength and the second wavelength are substantially equal (Figs. 1 and 2).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4-7, 12, 16, 18 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwa (US Patent No. 5,255,111) in view of BuAbbud et al (US Patent No. 6,535,308).

Regarding claim 4, Kwa differs from claim 4 in that he does not specifically teach

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a trans-impedance amplifier . BuAbbud, from the same field of endeavor, likewise teaches an optical transceiver for bidirectional communication over a single optical fiber. BuAbbud further teaches a trans-impedance amplifier (i.e., Fig. 5, col. 4, lines 32-67 and col. 5, lines 1-67). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the transimpedance amplifier as taught by BuAbbud in the system of Kwa. One of ordinary skill in the art would have been motivated to do this since allowing increasing the power level of the signal to a desired level.

Regarding claim 5, the combination of Kwa and BuAbbud teaches further comprising switchably coupling a signal driver to a diode during the transmit interval, the signal driver supplying the electrical transmit signal, the diode generating the optical transmit signal during the transmit interval (i.e., Figs. 1 and 2 of Kwa and Fig. 5 of BuAbbud).

Regarding claim 6, the combination of Kwa and BuAbbud teaches further comprising forward biasing the diode during the transmit interval to generate the optical transmit signal and reverse biasing the diode during the receive interval to generate the electrical receive signal in response to the received optical receive signal (i.e., Figs. 1 and 2 of Kwa, col. 4, lines 10-67 and col. 5, lines 1-50).

Regarding claim 7, the combination of Kwa and BuAbbud teaches further comprising transitioning between the receive interval and the transmit interval to maintain a short communication latency (i.e., Fig. 4 of BuAbbud, col. 4, lines 1-15).

Regarding claims 12, 16 and 25, the combination of Kwa and BuAbbud teaches generating the optical transmit signal comprises directly modulating a laser diode and wherein receiving the optical receive signal comprises receiving the optical receive signal with a P-I-N diode (Fig. 2 of BuAbbud).

Regarding claim 18, the combination of Kwa and BuAbbud teaches wherein the PMD comprises: a receive amplifier to amplify the electrical receive signal during the receive mode; a signal driver to drive the OSD with the electrical transmit signal during the transmit mode; and a switch to switchably couple the OSD to the receive amplifier during the receive mode and to switchably couple the OSD to the signal driver during the transmit mode (i.e., Figs. 1 and 2 of Kwa and Fig. 5 of BuAbbud).

5. Claims 8, 21, 22 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwa (US Patent No. 5,255,111) in view of Akimoto et al (Pub. No.: US 2003/0039010).

Regarding claims 8, 21, 22 and 31, Kwa differs from claims 8, 21, 22 and 31 in that he does not specifically teach adjusting a bit-rate of the electrical transmit signal. However, Akimoto teaches adjusting a bit-rate of the electrical transmit signal (i.e., Fig. 1, page 6, paragraph [0073]-[0074]). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the adjusting a bit-rate of the electrical transmit signal as taught by Akimoto in the system of Kwa. One of ordinary skill in the art would have been motivated to do this since allowing increasing the capacity of the optical communication system.

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6. Claims 10, 24, 34, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwa (US Patent No. 5,255,111) in view of Nomura (US Patent No. 6,731,881).

Regarding claims 10, 24, 34, 36 and 37, Kwa differs from claims 10, 24, 34, 36 and 37 in that he does not specifically teach isolating the electrical receive signal from the electrical transmit signal with an echo cancellation circuit. However, Nomura teaches isolating the electrical receive signal from the electrical transmit signal with an echo cancellation circuit (i.e., Figs. 3 and 4, col. 6, lines 10-67 and col. 7, lines 1-60). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the isolating the electrical receive signal from the electrical transmit signal with an echo cancellation circuit as taught by Nomura in the system of Kwa. One of ordinary skill in the art would have been motivated to do this since allowing removing the signal noise and increasing the signal to noise ratio.

7. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kwa (US Patent No. 5,255,111) in view of BuAbbud et al (US Patent No. 6,535,308) and further in view of Bremner et al (Pub. No.: US 2004/0264973).

Regarding claim 13, Kwa as modified by BuAbudd differs from claim 13 in that he does not specifically teach an electro-absorption modulator. However, Bremner teaches an electro-absortion modulator (i.e., Figs. 2 and 3, pages 1 and 2, paragraphs [0015]-[0018]). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the electro-absortion modulator as

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taught by Bremner in the system of Kwa modified by BuAbudd. One of ordinary skill in the art would have been motivated to do this since allowing improving the chirp performance, low drive voltage, and small size.

***Allowable Subject Matter***

8. Claims 17, 19, 26 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

  
**HANH PHAN**  
**PRIMARY EXAMINER**